Investigations for Replacement of the Primary Channel Louver System at the Tracy Fish Collection Facility

Investigators

Brent Mefford
Hydraulic Engineer, P.E.
Hydraulic Investigations and Laboratory Services
bmefford@usbr.gov

Bryan Heiner
Hydraulic Engineer
Hydraulic Investigations and Laboratory Services
bheiner@usbr.gov

Summary

This study will investigate replacing the primary fish collection system at the Tracy Fish Collection Facility (TFCF) with fish screens supporting vertical debris removal systems. The primary fish collection system is the first mechanism for separating fish from Delta flows approaching the Tracy Pumping Plant. Fish enter the primary channel and encounter a single line of louvers that extends approximately 320 ft at a 15° angle to the flow. Louvers guide fish into any of four 6-in bypass columns. The bypass columns transition into 36-in pipes that transport the fish into the secondary channel. The current system is over 50 years old and should be evaluated for replacement to improve fish salvage efficiencies at the TFCF.

Problem Statement

Since the construction of the primary channel over 50 years ago many new facilities have been built in the South Delta that influence the flow and debris load of water arriving at the facility. Changing flow and debris conditions often prevent operation of the primary louvers and bypass pipes to meet established salvage criteria regarding bypass entrance velocity ratios and louver line flow conditions set forth by state and federal resource agencies. Debris loads on the primary louvers continues to be a maintenance issue. Louver debris loads were significantly reduced with the addition of an automated trashrack cleaner in 2010, however cleaning of the louvers a minimum of twice a day is still required and remains a significant impact to fish salvage. In order to clean clogged louvers, individual louver panels must be raised and spray washed. This typically occurs each day in the morning and evening. Cleaning allows fish to pass through the lifted section of the louvers, thus allowing fish entering the facility to bypass the salvage passing downstream into the canal and predator species holding downstream of the louvers to move upstream into the primary channel (although feasible, predator movement upstream was not found by Bark *et al*. Volume 45 draft). During the cleaning process, flow velocities through the lifted panel opening are higher than surrounding lover panels. This abnormality in the velocity field through the louvers also likely contributes to increased fish losses. Cleaning all panels takes about 2 h to complete which

corresponds to a breech in the primary fish salvage barrier of about 4 h each day. This research project will investigate screening concepts that will improve the primary channel collection process. The benefits to fish salvage of louver replacement are continuous management of debris, a significant reduction in barrier port size (from 1 in to <0.25 in) and a system that can be cleaned without lifting panels therefore maintaining a continuous barrier. Similar research was completed for the secondary channel which evolved into the scheduled replacement of the secondary louvers with traveling screens in 2013.

Goals and Hypotheses

Goals:

1. Investigate possible screening and debris removal alternatives to the primary channel louver system at a feasibility level. Identify likely improvements in salvage efficiency for alternatives.

Hypotheses:

1. Replacement of the louver array with screens will increase salvage efficiencies of the primary channel.

Materials and Methods

Investigations (literature review, preliminary sizing, space limitations, etc.) will focus on concepts that can be constructed to improve the salvage efficiencies of the primary channel. The study will focus on alternatives to replace the existing louver line with traveling screens with debris removal systems or fixed screens with fish-friendly automated vertical debris rakes. Hydraulic evaluation of the alternatives will be conducted to determine the level of fish protection (screen port size, approach velocity and fouling rate) that can be achieved compared to the existing louvers. Because the structure size and diversion rate will not differ with louver replacement, a screening alternative is not intended to achieve compliance with the National Marine Fisheries Service (NMFS) criteria for screening listed species.

Coordination and Collaboration

The study will be coordinated between the Technical Service Center (TSC), Mid-Pacific Region, TFCF staffs, and the interagency Tracy Technical Advisory Team through regular updates and meetings.

Endangered Species Issues

This study will not require permitting.

Dissemination of Results (Deliverables and Outcomes)

This study will enable TSC researchers to develop concepts that could be used to improve salvage efficiencies in the primary channel at the TFCF. A technical memorandum describing several concept-level improvements to the primary channel louver system will be delivered TFCF personnel by October 2012. The TM will include pre-feasibility level design drawings of the alternatives.